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FOUR PORT CIRCULATOR,(U)
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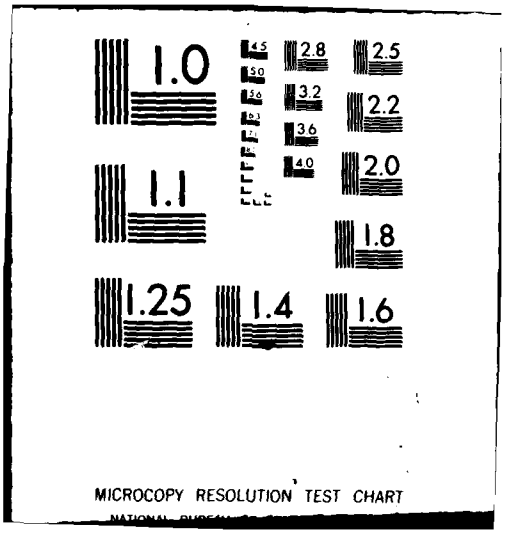
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FOREIGN TECHNOLOGY DIVISION

FOUR PORT CIRCULATOR

by

V.V. Oress, I.A. Naumov, and A.K. Stolyarov

EDITED TRANSLATION

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	*А а*	A, a	Р р	*Р р*	R, r
Б б	*Б б*	B, b	С с	*С с*	S, s
В в	*В в*	V, v	Т т	*Т т*	T, t
Г г	*Г г*	G, g	У у	*У у*	U, u
Д д	*Д д*	D, d	Ф ф	*Ф ф*	F, f
Е е	*Е е*	Ye, ye; E, e*	Х х	*Х х*	Kh, kh
Ж ж	*Ж ж*	Zh, zh	Ц ц	*Ц ц*	Ts, ts
З з	*З з*	Z, z	Ч ч	*Ч ч*	Ch, ch
И и	*И и*	I, i	Ш ш	*Ш ш*	Sh, sh
Й й	*Й й*	Y, y	Щ щ	*Щ щ*	Shch, shch
К к	*К к*	K, k	Ъ ъ	*Ъ ъ*	"
Л л	*Л л*	L, l	Ы ы	*Ы ы*	Y, y
М м	*М м*	M, m	Ь ь	*Ь ь*	'
Н н	*Н н*	N, n	Э э	*Э э*	E, e
О о	*О о*	O, o	Ю ю	*Ю ю*	Yu, yu
П п	*П п*	P, p	Я я	*Я я*	Ya, ya

*ye initially, after vowels, and after ъ, ь; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	$\sinh^{-1}$
cos	cos	ch	cosh	arc ch	$\cosh^{-1}$
tg	tan	th	tanh	arc th	$\tanh^{-1}$
ctg	cot	cth	coth	arc cth	$\coth^{-1}$
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian	English
rot	curl
lg	log

A

FOUR PORT CIRCULATOR

V. V. Oress, I. A. Naumov,
and A. K. Stolyarov.

There are circulators which are in the form of waveguide slotted bridges, in which ferrite samples are arranged which are under the effect of transverse magnetic fields.

These devices have large overall dimensions and weight, and are difficult to tune.

The four port circulator being proposed is different from these in that the ferrite element is made in the form of a set of toroids fabricated from a material with a rectangular hysteresis loop which are arranged on a dielectric sleeve and it is located in the center of the slotted bridge.

As a result, the overall dimensions are reduced and the tunning of the circulator is simplified.

The circulator being described is depicted in the drawing.

The circulator is a waveguide slotted bridge 1, at the center of which, along the axis of symmetry, is a set of toroidal ferrites 2 arranged on a dielectric sleeve 3. Inside this sleeve is a metal conductor 4 which, when pulsed current passes through it, becomes the source of a circular magnetic field, which magnetizes the ferrites to the point of saturation. The ends of the metal conductor extend beyond the waveguide. At the point where the ferrite samples are located, the slotted waveguide is narrowed to the dimension of a single waveguide. Part of the ferrites and dielectric inserts located at the ends of the ferrite

set are in the wide portion of the slotted bridge. The low inductance of the controlling conductor (1-2 uH) makes it possible to switch the SHF energy in the period of time from 50 to 200 ns by means of the circulator being proposed. Furthermore, the absence of a magnetic system results in a considerable reduction in weight (by about 1.3 kg) and overall dimensions.

An experimental model of a four port circulator was constructed in the 3-cm range of waves, with the direct losses of not over 1 dB and decouplings of not less than 19 dB in all the channels. Toroidal ferrites, domestic trademark P-28, were used in this model.

Patent Claims

A four port circulator consisting of a waveguide slotted bridge, a ferrite element, and a magnetic system is distinguished by the fact that in order to reduce the overall dimensions and to simplify tunning the ferrite element is in the form of a set of toroids arranged on a dielectric sleeve and is located in the center of the slotted bridge.